

What are Grids?

A discussion on grids and gridded census data.

Annual State Data Center meeting July 26, 2023

Gridded Census Datasets

- Researching a new data product.
- Initial development stage.
- Gathering data user input.

Project Overview

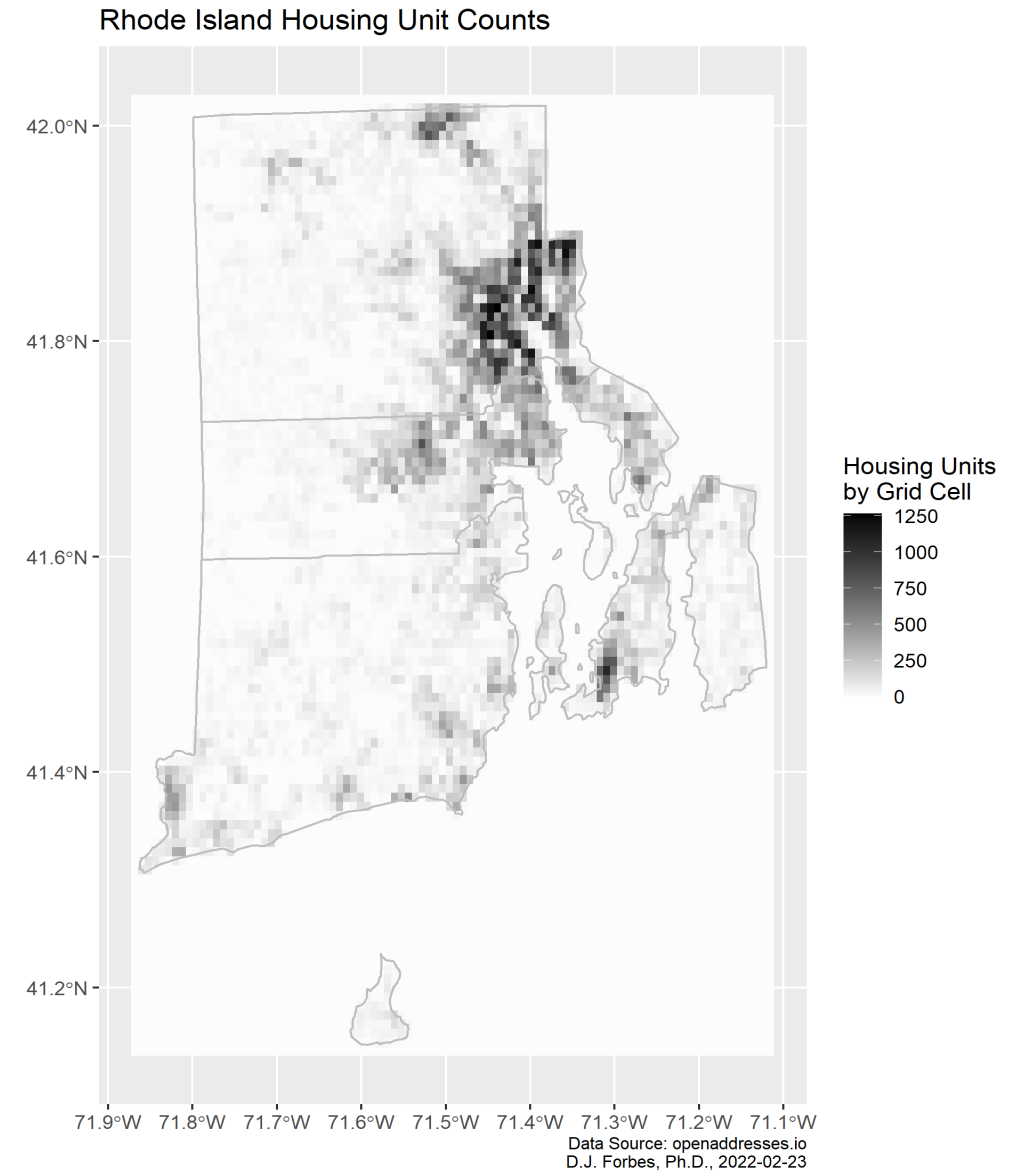
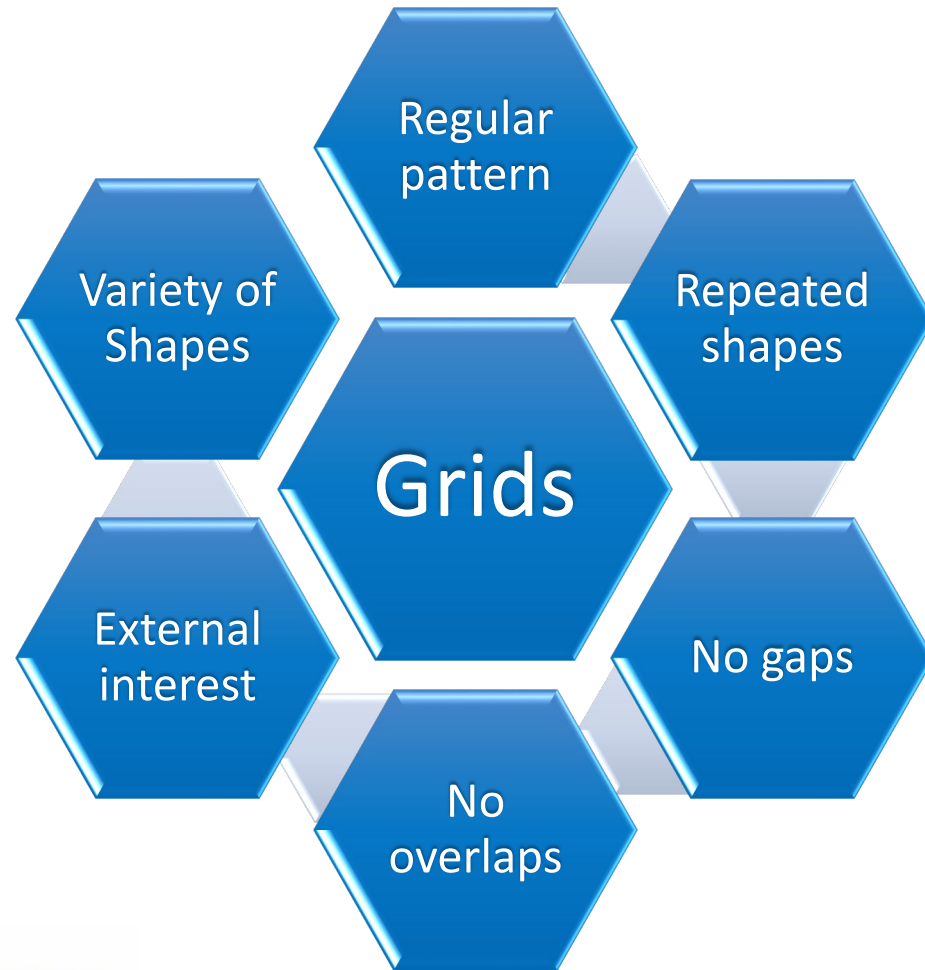
Purpose:

- Expand our available product portfolio to **meet changing demands**.
- More accessible, interoperable, and relevant data.
- Producing **new and innovative** Census data products.
- Fulfillment of mission needs and **meeting stakeholder requests**.
- **Creating quality products** to ensure we meet today's data demands.
- Providing tools to **support informed, timely decisions**.

Expectations:

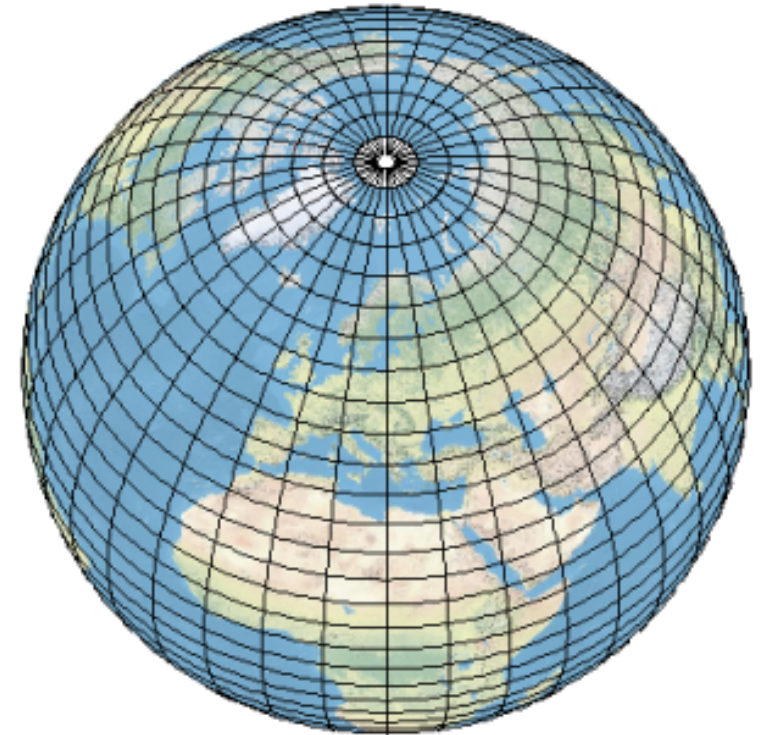
- Gridded data products will be **in addition to** current administrative/statistical units.
- We will produce gridded data products as a **standard annual public delivery**.

What are grids?



What are grids?

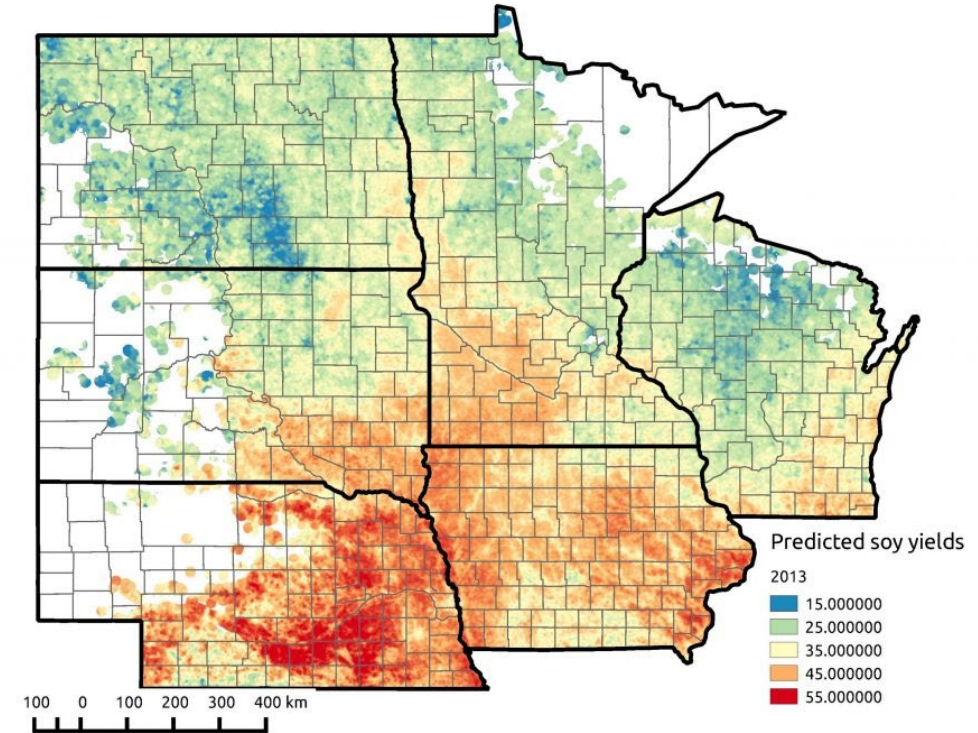
- A grid is a network of either parallel lines (*e.g.*, lat/lon) or shapes (squares, triangles, hexagons, quadrilaterals) to identify, describe, or discretize locations on the Earth's surface.
- One example are the graticules showing lines of latitude (horizontal parallel lines) and lines of longitude (vertical lines or meridians that meet at the poles) on the Earth's surface.
- Maps made with straight lines.
- "A grid is a regular tessellation of a 2-D surface that divides it into a series of contiguous cells."
 - Each cell is assigned a unique identifier which is used for spatial indexing.
 - Each cell contains a value that represents something over that cell's footprint.



<https://desktop.arcgis.com/en/arcmap/latest/map/page-layouts/what-are-grids-and-graticules-.htm>

What are gridded data?

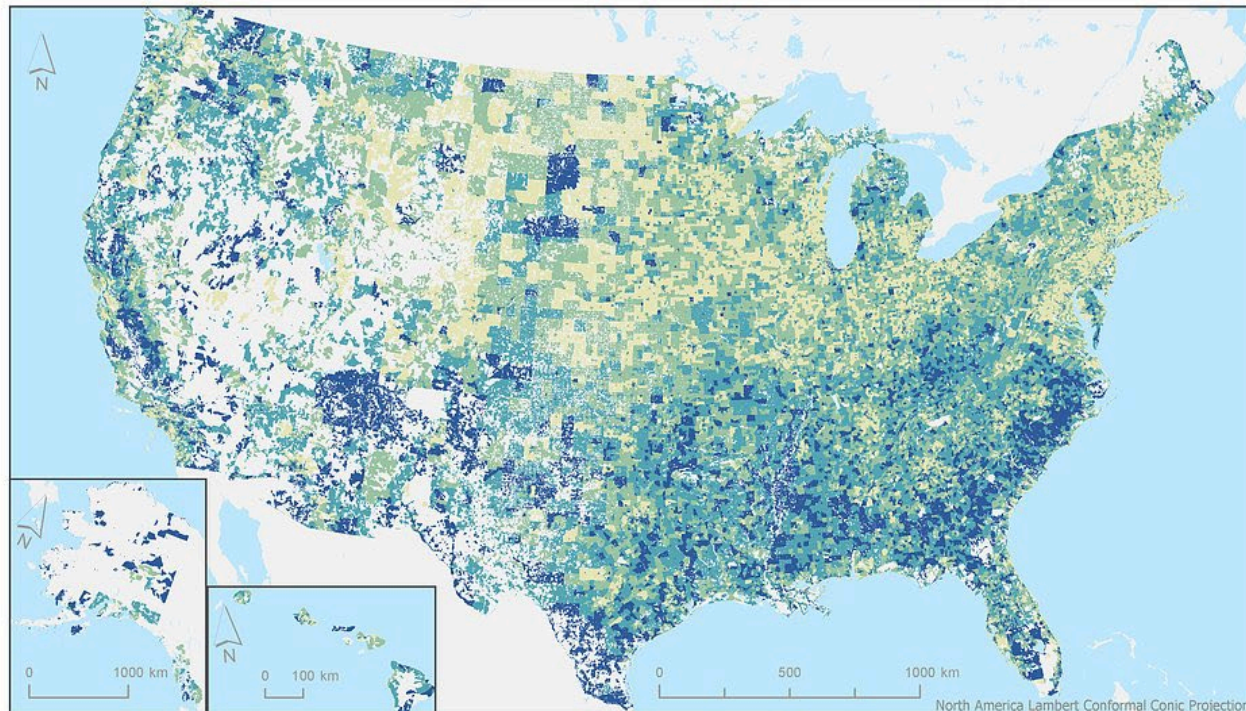
- Gridding data is to assign data values to grid cells.
- Grids are always aggregates because they use single values to describe (represent) a two-dimensional area of the Earth's surface.
- Examples:
 - Counts (number of housing units)
 - Sums (economic output in dollars, expected crop yield)
 - Averages (temperature, rainfall)
- All maps are ~~representative~~ wrong, but some are useful (to paraphrase George E. P. Box).



Examples – Domestic Grids

U.S. Social Vulnerability Index Grids (2018): Overall Score

U.S. Census Grids



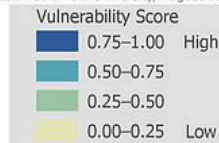
The U.S. Social Vulnerability Index Grids are part of the U.S. Census Grids collection. This map displays the overall score for the Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) gridded at a spatial resolution of 1 km with a mask for no population for the year 2018.

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Data Source: Center for International Earth Science Information Network - CIESIN - Columbia University, 2021. U.S. Social Vulnerability Index Grids. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). <https://doi.org/10.7927/6s2a-9r49>.

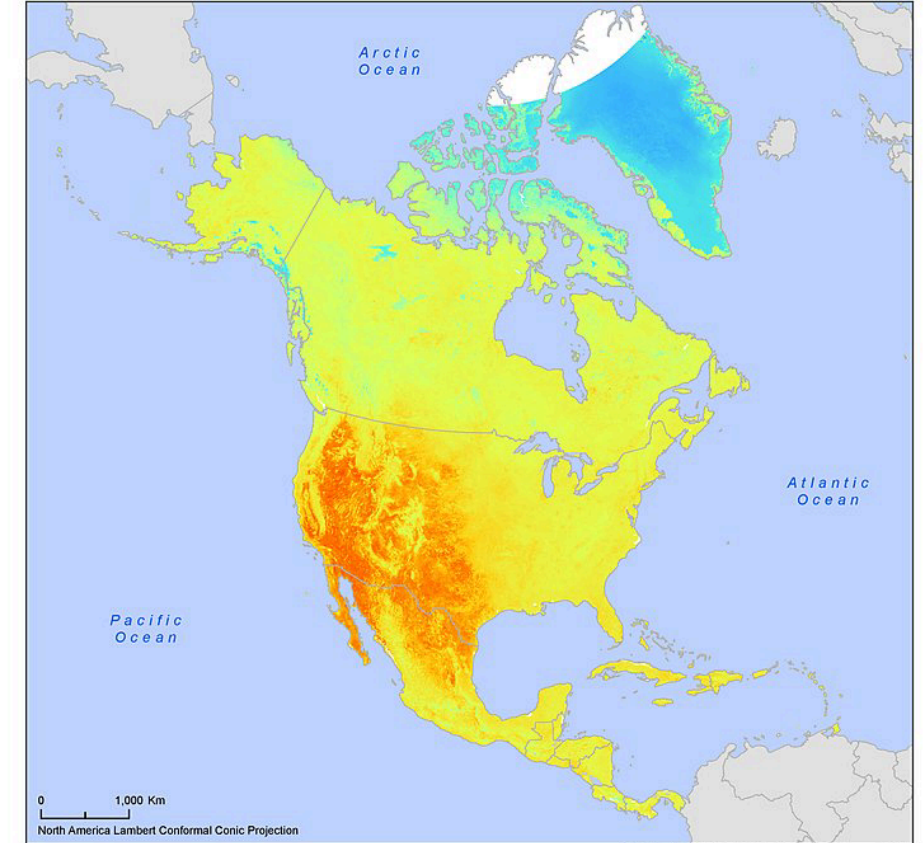
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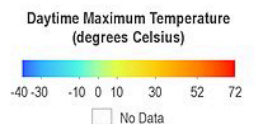


Summer Daytime Maximum Land Surface Temperature (LST), 2013: North America

Satellite-Derived Environmental Indicators



The Global Summer Land Surface Temperature (LST) Grids, 2013, part of the Satellite-Derived Environmental Indicators collection, estimate daytime (1:30 p.m.) maximum temperature and nighttime (1:30 a.m.) minimum temperature in degrees Celsius at a spatial resolution of ~1km during summer months of the northern and southern hemispheres for the year 2013. The LST grids are produced using the Aqua Level-3 Moderate Resolution Imaging Spectroradiometer (MODIS) Version 5 global daytime and nighttime LST 8-day composite data product (MYD11A2).



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Data Source: Center for International Earth Science Information Network - CIESIN - Columbia University, 2016. Global Summer Land Surface Temperature (LST) Grids, 2013. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). <http://dx.doi.org/10.7927/H4086387>.

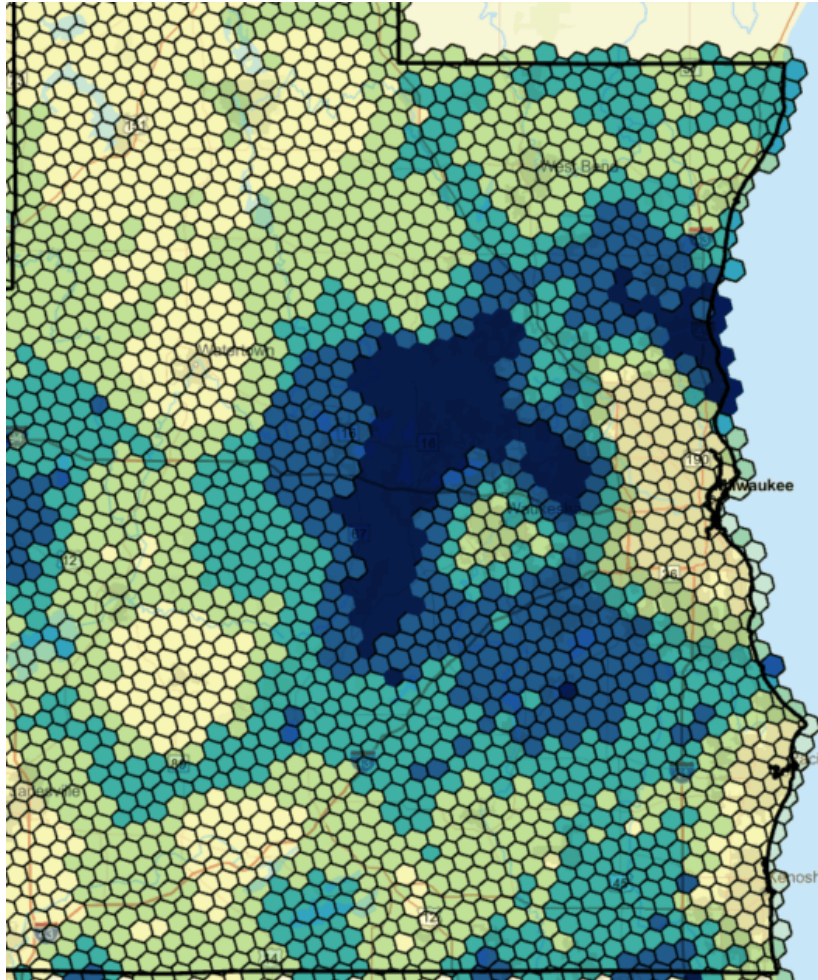
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GEOGRAPHY

Grids Advantages



Uniform Area

Consistent and Unchanging

Easily Integrated

Alternative Boundaries

Small Area Analysis

Consistent Work Units

Where is “Here”?

- Sometimes this question can be meaningfully answered with a word linked to an administrative or statistical boundary (e.g. “here in Maryland”, “here in Philadelphia”, “here in Census tract 7”).
- But sometimes those units aren’t appropriate because:
 - boundaries may have changed (illusory stability—in fact change is the norm for administrative units);
 - comparisons are difficult or hard to intuitively grasp owing to units radically different physical areas;
 - these units do not actually encapsulate the spatial extent of many important events and phenomena.



Current Work

Engaging
with the
statistical
community

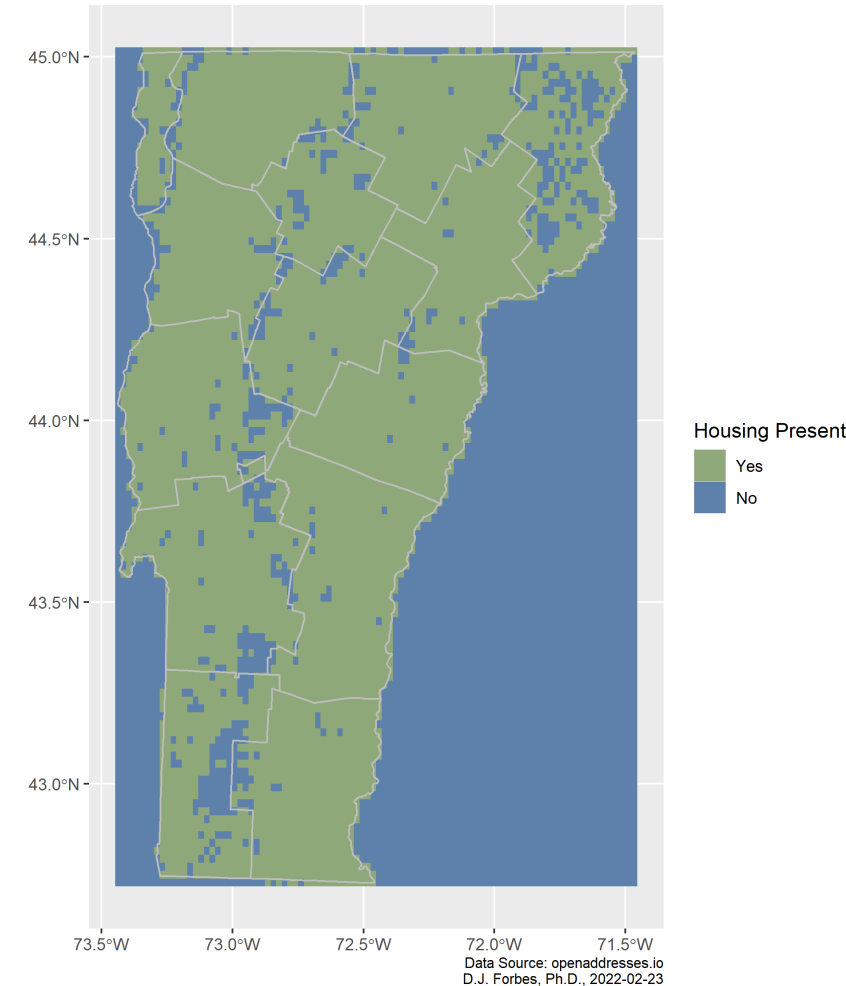
Integrating
grids into
existing
processes

Developing
testing and
quality
control
procedures

Planning
for storage
and public
access

Staffing and
resource
planning

Vermont Presence/Absence - Housing Units



Key Questions for our data partners!

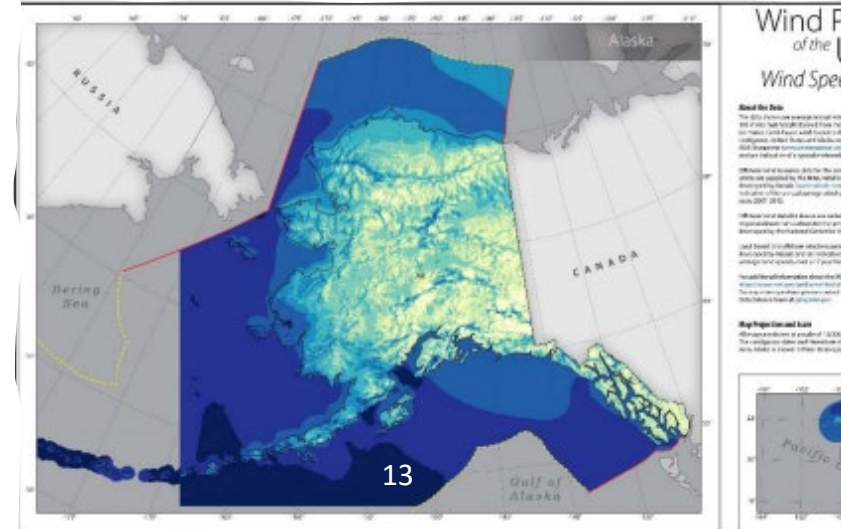
- How should we communicate with YOU, our data users to solicit input?
- We want your feedback on data use-cases and requirements:
 - Statistical data -
 - What census and survey data should be disseminated?
 - Decennial Census Data? American Community Survey data? Economic data?
 - Minimal vs. maximal datasets –
 - What's does the “minimum viable dataset” look like for your needs?
 - Integration of other datasets – what would you “mashup” with census data?
 - Geospatial formats and preferences -
 - Raster vs Vector.
 - Shape and Size(s) of Grid Cells.
 - Equal area vs equal dimensions.

Discussion



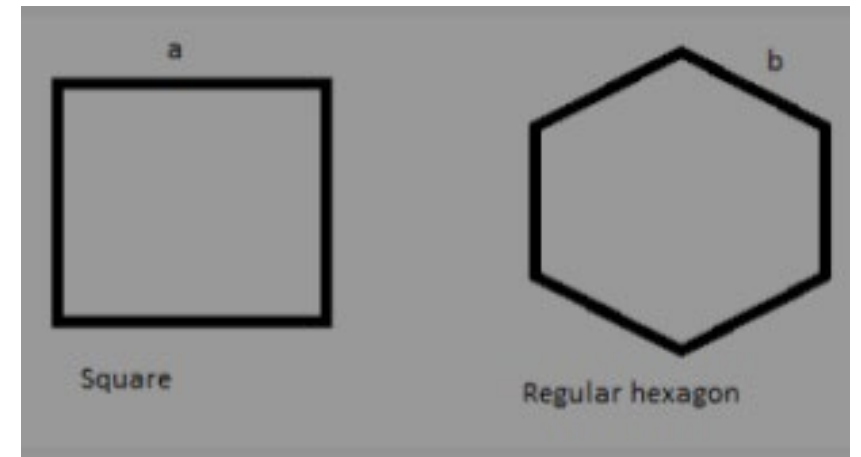
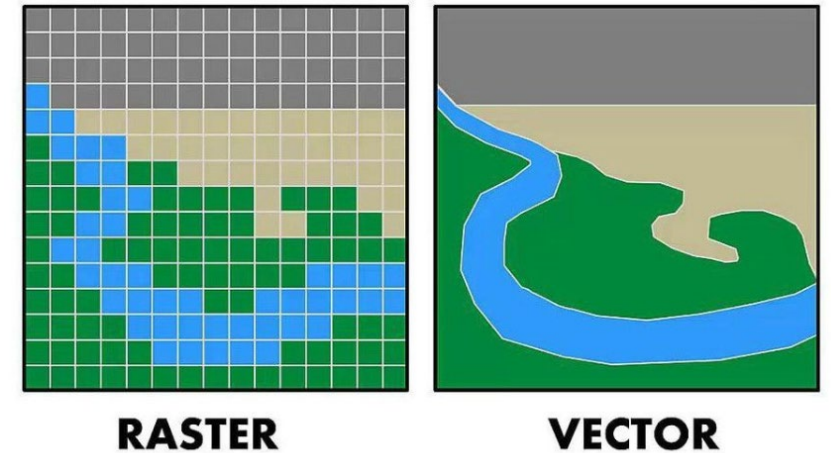
Current grids

- Do agencies in your state use gridded data?
- If yes, what kind of gridded data?
 - Earth Observation/Remotely Sensed/Satellite Imagery
 - Elevation data
 - Land Use/Land Cover data
 - Transportation/Traffic
 - Population/Housing/Demographics



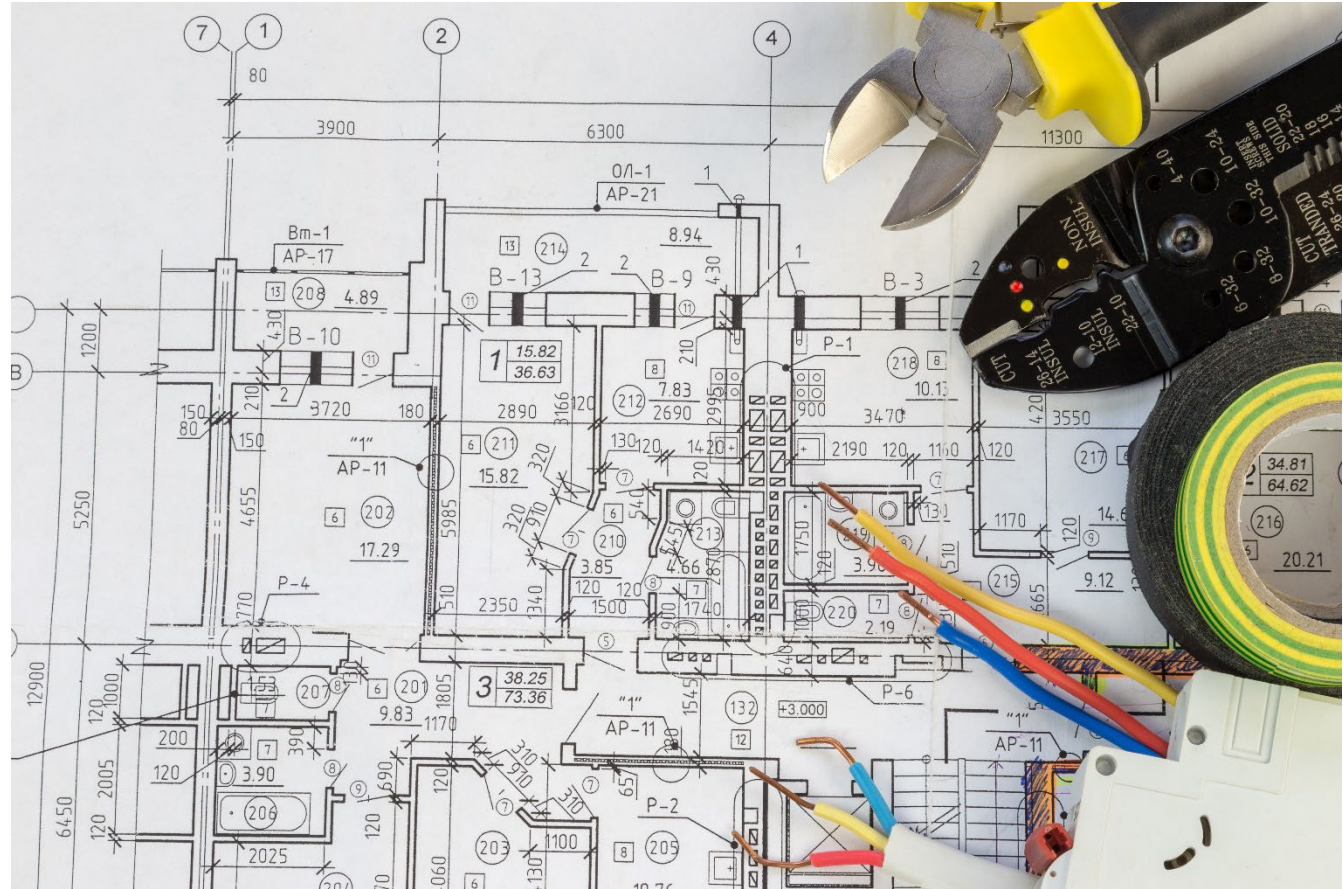
Grids – geospatial

- For those that use grids, what type of grid are you using?
 - Raster data?
 - Shape
 - Rectangle/quadrilateral? Hexagonal?
 - Size?
 - 1km? 5km?
 - Existing standard (e.g. DGGs or National Grid) or self-generated grid?



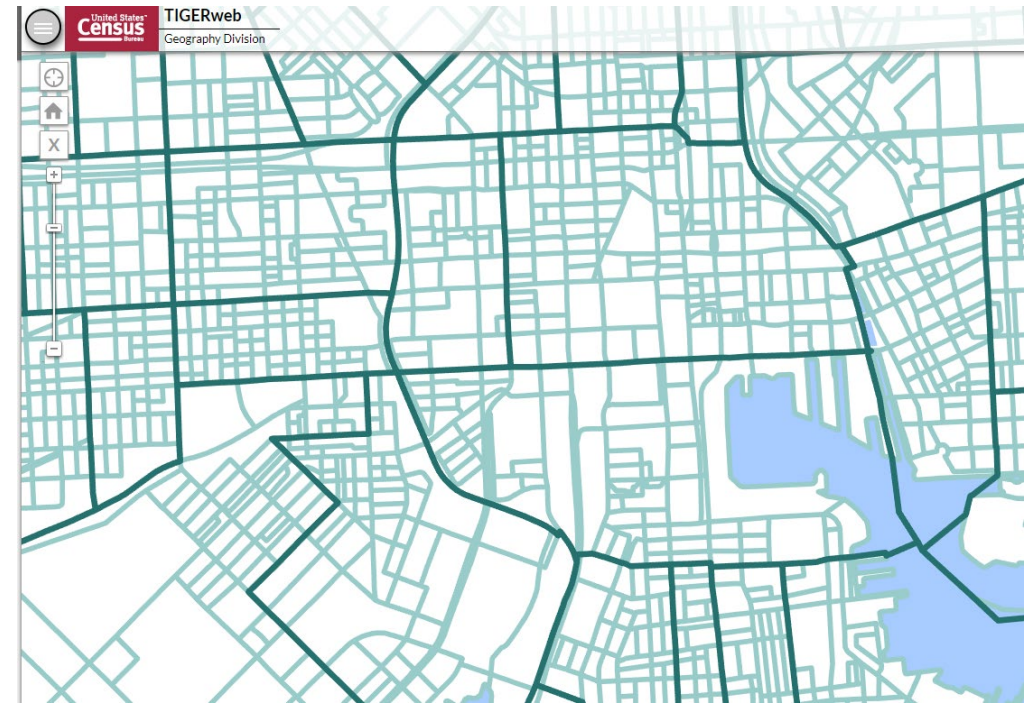
Grids – use-cases

- If we produced grids, how would you use them?
- What use cases do you have for grids?
- What statistical data might be useful in a grid?



Grids – comparative geographies

- What is the smallest geography you frequently use?
 - Tracts? Block groups? Blocks? Other?
- What statistical data do you use with these geographies?
 - Demographic/Housing characteristics or counts.
 - Business, Jobs, Employment characteristics or counts.
 - Socio-economic characteristics or counts.
 - Other?
- What drawbacks or limitations do you find with these geographic units?





Final Discussion

- What final thoughts do you have about grids?
- What are your gridded data needs?
- What requirements would you like to communicate to us?
- Please share any final thoughts with us at **geo.grids@census.gov**